

WHAT IS CLAIMED:

1. A method of identifying a tagged item comprising:
recovering a nucleic acid containing taggant sample from an item,
5 wherein the taggant sample potentially contains one or more target nucleic acids;
providing a detection unit comprising one or more sets of
electrically separated electrical conductor pairs, each conductor having an
attached capture probe such that a gap exists between the capture probes of a pair
of electrically separated conductors, wherein the capture probes for each pair of
10 separated electrical conductors are complementary to one of the target nucleic
acids;
contacting the sample with the detection unit under conditions
effective to permit any target nucleic acid present in the taggant sample to bind to
the capture probes, thereby connecting the capture probes; and
15 detecting any target nucleic acid present in the taggant sample by
determining whether electricity is conducted between the electrically separated
conductors, thereby identifying the tagged item.
2. The method according to claim 1, wherein the taggant
20 sample further comprises random nucleic acid molecules mixed with the target
nucleic acids.
3. The method according to claim 1, wherein the target nucleic
25 acids comprise 10 to 30 nucleotides.
4. The method according to claim 3, wherein the target nucleic
acids are selected from the group consisting of DNA, RNA, peptide nucleic acids,
and locked nucleic acids.
5. The method according to claim 1, wherein the capture
30 probes comprise 10 to 30 nucleotides.

6. The method according to claim 5, wherein the capture probes are selected from the group consisting of DNA, RNA, peptide nucleic acids, and locked nucleic acids.

5 7. The method according to claim 1, wherein the taggant sample further comprises a matrix.

8. The method according to claim 7, wherein the matrix is selected from the group consisting of polyvinylalcohol, polyethyleneglycol, 10 polyethyleneimine, polyvinylpyridine, hydroxyethylcellulose, polyvinylbutyral, polyvinylpyrrolidone, polyvinylimidazole, and a combination thereof.

9. The method according to claim 1 further comprising: contacting the capture probes with nucleases after said contacting.

15 10. The method according to claim 1 further comprising: contacting the capture probes with ligase after said contacting; and heating the capture probes to a temperature high enough to denature any non-ligated target nucleic acids from the capture probes.

20 11. The method according to claim 1 further comprising: applying a conductive material over the capture probes and any target nucleic acid after said contacting.

25 12. The method according to claim 11, wherein the conductive material is selected from the group consisting of gold, silver, and mixtures thereof.

13. The method according to claim 1, wherein the taggant sample is stable under ambient conditions.

30 14. The method according to claim 1, wherein the taggant sample is applied to the item in a manner that allows removal of a sample for identification.

15. The method according to claim 14, wherein the taggant sample is ink.

5 16. The method according to claim 15, wherein the taggant sample is printed onto the item or a package containing the item.

10 17. The method according to claim 1, wherein the item to which the taggant sample is applied is selected from the group consisting of fabric, paper, cardboard, wood, plastic, nylon, nitrocellulose, rubber, resin, gel, liquid, and adhesive.

15 18. The method according to claim 17, wherein the item is fabric.

19. The method according to claim 18, wherein the item is an article of clothing.

20 20. The method according to claim 17, wherein the item is paper or plastic.

21. The method according to claim 19, wherein the paper or plastic is a label.

25 22. The method according to claim 21, wherein the label is a bar-code label.

23. The method according to claim 21, wherein the label is a tamper-proof label.

30 24. The method according to claim 17, wherein the item is cardboard.

25. The method according to claim 24, wherein the cardboard is
a product's packaging.

26. The method according to claim 25, wherein the taggant is
5 applied to the exterior surface of the packaging.

27. The method according to claim 24, wherein the taggant is
incorporated into the product's packaging.

10 28. The method according to claim 1, wherein the item the
taggant is applied to a medicament.

15 29. The method according to claim 28, wherein the medicament
is selected from the group consisting of a capsule, a pill, a tablet, a lozenge, and an
ointment.

20 30. The method according to claim 1, wherein the device has a
plurality of pairs of separated electrical conductors, each pair having attached
capture probes that are complementary to a different target nucleic acid.

25 31. A nucleic acid taggant identification kit comprising:
a nucleic acid-containing taggant comprising one or more target
nucleic acids and

30 a detection cartridge comprising:
one or more sets of electrically separated electrical
conductor pairs, each conductor having an attached capture probe
such that a gap exists between the capture probes of a pair of
electrically separated conductors, wherein the capture probes for
each pair of separated electrical conductors are complementary to
one of the target nucleic acids.

32. The kit according to claim 31, wherein the target nucleic acids are selected from the group consisting of DNA, RNA, peptide nucleic acids, and locked nucleic acids.

5 33. The kit according to claim 31, wherein the taggant sample further comprises random nucleic acid molecules mixed with the target nucleic acids.

10 34. The kit according to claim 31, wherein the target nucleic acids comprise 10 to 30 nucleotides.

35. The kit according to claim 31, wherein the taggant mixture further comprises a matrix.

15 36. The kit according to claim 35, wherein the matrix is selected from the group consisting of polyvinylalcohol, polyethyleneglycol, polyethyleneimine, polyvinylpyridine, hydroxyethylcellulose, polyvinylbutyral, polyvinylpyrrolidone, polyvinylimidazole, and a combination thereof.

20 37. The kit according to claim 31 further comprising:
a material capable of producing a conductive coating.